James Acker:
Suhung, Atheer will make you the presenter.
To advance your animations, keep clicking on the right arrow.

Suhung Shen is my office neighbor at the GES DISC, but joins us today from China, talking about high resolution land data.

She visiting family in Beijing.

OK, just a moment while I upload her presentation.

Suhung Shen:
I'll begin.

This presentation will give a quick overview of satellite remotely sensed land products in Giovanni and sample plots generated from Giovanni. The remotely sensed land products in Giovanni are available through NASA funded projects, data support to international programs: NEESPI (Northern Eurasia Earth Science Partnership Initiative) and MAIRS (Monsoon Asia Integrated Regional Study) at GES DISC, PI: Dr. Gregory Leptoukh

As listed, total of eight different land products from a number of sensors have been integrated into the Giovanni system. Documents and detailed information about these products are summarized on the MAIRS project page: http://disc.sci.gsfc.nasa.gov/mairs/data-holdings

Land products in Giovanni are available at three different spatial resolutions:

Low resolution: 1x1 degree of global coverage for studying large scale features and for comparing to global models. Data are pre-processed from standard land products (mostly 0.05 x 0.05 degree) for integrating into Giovanni

Medium resolution: 0.05 x 0.05 degree resolution for regional studies, global. Most of the data are standard products

Higher resolution: 1x1 km or 0.5 x 0.5 km resolution, over Asia only. Data are pre-processed from original tiled data. These type of products are mainly for small region or local studies.

Due to large data volume, standard MODIS Level 3 land products of 1km or higher spatial resolution are distributed in tiles as shown on the image in sinusoidal projection. Tiles over the Monsoon Asia region (red boxes) were downloaded from NASA LP DAAC and pre-processed before integrating them into the Giovanni system, including a) mosaic all tiles, and b) projecting data to equirectangular projection with the nearest point resampling method.

This is a sample of MODIS land cover types data in Giovanni. Images show the majority of land cover types at 0.05 deg (5.6 km) resolution over south and north America. This is the result of IGBP classification, giving 17 land cover types. The land cover types at 5.6 km of two other classification methods (UMD and LAI_fPAR) are also available.

Next view: This image is similar to the previous view, but over Eurasia and northern Africa.

Next view: If you would like to see more detailed land cover type, say, the boxed area

Next view: The 500m data is available in Giovanni (over the Asia region only).

Monthly global MODIS land surface temperature (LST) are available at 5.6km and 1x1 degree resolution. 8-day averaged LST are also available at 5.6km (global) and 1km (Asia region). The monthly climatology (base period 2000-2011) are also integrated into the system for climate and anomaly analysis. The image on left shows the monthly daytime LST anomaly for March 2012 over north America, revealing extreme warm temperatures during early Spring of 2012 over large area of north America. The monthly LST is warmer than normal by more than 10 K over many region. The image on right is the monthly normalized difference vegetation index (NDVI) anomaly of March 2012. It is clear, due to the extreme warm winter and spring from 2011 to 2012, the vegetation turned green much earlier than normal years.

James Acker:
Comment: I had not seen this image of the remarkable early spring NDVI anomaly before.

Suhung Shen:
This is another case of abnormal land surface properties due to climate anomaly. The left image shows the below normal precipitation observed from TRMM during summer 2011 over southwest America.

For the same area, weaker vegetation index were observed from MODIS (right image), especially over the grassland. The anomaly over cropland is less significant, which may be the result of irrigation of agriculture crops.

James Acker:
If we had 0.5 km data over the U.S., we might see circles from circular irrigation!

Suhung Shen:
This is a Giovanni generated time series of monthly anomaly for TRMM rain rate (left image) and MODIS-Terra NDVI (right image) from Jan 2006 to Dec 2011 over the boxed area on the previous slide. The time series data are downloaded from Giovanni.

Next view: The downloaded time series data are imported into Excel, and overlain for better shown the positive relationship between the precipitation and NDVI over this region.

James Acker:
Very good correlation.

Suhung Shen:
This is an example of exploring data at local scale in Giovanni. The upper images are stable nighttime lights (at 1km resolution) from DMSP-OLS for 2001 (top left) and 2010 (top right) over Yangtze River Delta region, China. High stable nighttime light values indicate clearly urban areas.

The lower images are daytime LST from MODIS-Terra during the summer (Jun, Jul, Aug) for 2001 (lower left) and 2010 (lower right). The LST over urban area are higher significantly than the surrounding rural areas, revealing the urban heat island effect. The local temperature over urban has increased significantly from 2001 to 2010 due to the land use changes associated to fast urbanization over Yangtze River Delta region.

This plot shows the daytime MODIS LST in the summer for 2001 (blue line) and 2011 (red line)

over the cross-section indicated on the previous slide. It is a different view of an urban heat island. The LST is higher over larger city than smaller ones. The maximum LST over large cities, such as Shanghai, is about 7 degrees higher than the rural area. The LST has been changed mostly over the suburban regions and middle-size cities, such as Suzhou.

Giovanni land products include active fires (or hot spots) from MODIS. This image is a long-term average of active fire pixel counts data over Euraisa. Active fires are observed frequently over forest, such as northern boreal forest region, and tropical forest region over south Asia. Seasonal active fires are also observed over croplands, such as central east China, and northwest India, most likely due to burning of agriculture remaining.

Taking a forest region over south Asia as an example.

Circled area.

The curve on the top panel is the area averaged monthly active fire pixel counts over a region of Laos (cycled area on previous slide), where the land are mostly covered by forest, showing a very strong seasonal variations associated with local climate. Fires occur mostly during the dry spring season (March and April).

8-day active fire mask data in Giovanni (1km resolution, over Asia only) enable one to view the location and time period of fires. The images of lower panel are fire mask locations during March 2004, March 2006, and April 2010, respectively.

Remote sensing land products in Giovanni are in the Giovanni portals under the group “Application and Education Portals” . Information about the MAIRS and NEESPI projects can be found under the project page listed.

James Acker:
That's the end of Suhung's presentation, which I think has enough information for three papers. Suhung is still awake in China and can answer any questions.

Suhung, have you shown the NDVI anomaly figure anywhere else, or is this presentation the

first time it has been publically shown?

Suhung Shen:
For March 2012

I have not shown it anywhere else.

James Acker:
I think given the "strangeness" of our spring and summer this year, it deserves to be made public. (Or published)

Paul, do you think this type of data would be useful for an ESSEA module?

Paul Adams:
I do.

James Acker:
So do I. We should talk. ;-)

Paul Adams:
I was thinking about sharing this with undergraduates as well. Very accessible.

Suhung Shen:
Thanks. Let's talk more about it when I am back.

James Acker:
Well, it's late night and the end of Day 1 of the Gregory G. Leptoukh 2012 Online Giovanni Workshop.
We'll get started

again tomorrow at 9 AM EDT, with a similar topic to what Suhung showed, change detection with Jan Verbesselt
from the Netherlands.

James Acker:
Excellent idea. And my computer is telling me that I have to have some patches installed now.
Good night!

Paul Adams:
Thanks for organizing this.